7-26-2011

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Beth Potier
UNH Media Relations

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July 26, 2011

DURHAM, N.H. – A high school football player's broken neck – from which he's recovered – has yielded breakthrough biomechanical data on cervical spine injuries that could ultimately affect safety and equipment standards for athletes. University of New Hampshire associate professor of kinesiology Erik Swartz collaborated on the study, which appears in a letter in the prestigious New England Journal of Medicine.

Swartz and lead author Steven Broglio of the University of Michigan captured this groundbreaking spinal fracture data while studying concussions. Broglio had fitted the helmets of football players at a high school in the Midwest with padded sensors as part of the Head Impact Telemetry System (HITS), which measures the location and magnitude of impacts to the helmet. During a head-down tackle, an 18-year-old cornerback in the study suffered both a concussion and a fracture of his cervical spine, or neck. (He has since fully recovered.)

"This is really novel," says Swartz, explaining that all previous research on cervical spine injuries have been done on cadavers, animals, or via mathematical modeling. "You can't create a cervical spine fracture in a healthy human, but here you have an actual event where we captured data during an actual cervical spine injury," he says.

Swartz notes that this research will bring real-world information to the study of axial load impact to the head and its effects on the spine. "We now have data that we know caused a serious spine injury in a healthy, 18-year-old strong-bodied athlete," he says.

Swartz, who teaches athletic training, was tapped by Broglio for his expertise in cervical spine injuries in athletes. Swartz helped analyze the acceleration data from the in-helmet sensors in collaboration with sideline video footage of the tackle to describe the effects of the impact to the player.

The authors see far-reaching implications for this work in the quest for greater safety in youth sports. In the journal letter, they note that sports and recreation activities are the second most common cause of cervical spine injuries for people under age 30, with an average lifetime cost of more than $3 million.

While concussions are far more common than broken necks among high school or college athletes, Broglio notes that media attention has been focused on professional sports. "To us, the larger public health issue is with the 1.5 million high school kids that play football each year. Not the 1,500 that play in the NFL," he says.

Swartz adds that this work will inform ongoing discussions about the safety and long-term effects of head-down tackles. "It sends a huge message to the athletic community about head-down impact," he says.

The research, "In Vivo Biomechanical Measurements of a Football Player's C6 Spine Fracture," along with the sideline video of the tackle, is available to download from the July 21, 2011 edition of the New England Journal of Medicine:

http://www.nejm.org/doi/full/10.1056/NEJMc1102689?query=featured_home. In addition to Swartz and Broglio, co-authors are Joseph Crisco of Brown University and Robert Cantu, M.D., of Emerson Hospital in Concord, Mass.

The department of kinesiology is in the College of Health and Human Services. The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 12,200 undergraduate and 2,300 graduate students.

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Reporters and editors: Erik Swartz is available at eswartz@unh.edu or 603-862-0018.

Media Contact: Beth Potier | 603-862-1566 | UNH Media Relations

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